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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,417	03/01/2002	Chihaya Adachi	10020/21302	3481

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EXAMINER
KEANEY, ELIZABETH MARIE

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 04/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/087,417	ADACHI ET AL.	
	Examiner	Art Unit	
	Elizabeth Keaney	2882	AW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Receipt is acknowledged of the Amendments and Remarks filled 12 January 2004.

Response to Arguments

Applicant's arguments, see pages 23-26, filed 12 January 2004, with respect to the rejection(s)of claim(s) 1-44 under 102 and 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Hatwar (US Patent 6,696,177).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000.

Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-3,7-11,17-21 and 27-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Hatwar.

Re claim 1: Hatwar discloses, in figure 9 and throughout the disclosure, an organic light emitting device comprising:

- an anode (210);
- a hole transporting layer (341a) over the anode (210),
    - wherein the hole transporting layer is doped with a phosphorescent material (column 4, lines 20-21);
- an electron transporting layer (343a) over the hole transporting layer (341a),
    - wherein the electron transporting layer (343a) is doped with the phosphorescent material (column 14, lines 20-21); and
- a cathode (230) over the electron transporting layer (343a).

Re claims 2,10 and 20: Hatwar discloses an organic light-emitting device that emits light in the blue region of the visible spectrum (column 14, line 19).

Re claims 3,11 and 21: Hatwar discloses the hole transporting layer comprises a member of the group consisting α-NPD, TPD, M14, MTDATA, HMTPD and R854 (column 5, line 45-column 6, line 8).

Re claims 7,17, and 27: Hatwar discloses the cathode comprising a member of the group consisting of magnesium silver and a magnesium silver alloy (Table 1), and the anode comprising ITO (column 10, line 6).

Re claims 8,18 and 31: Hatwar discloses the organic light-emitting device being incorporated in an electronic device selected from the group consisting of the electronic device selected from the group consisting of a billboard, a sign, a computer monitor, a vehicle, a telecommunications device, a telephone, a printer, a television, a large area wall screen, a theater screen and a stadium screen (column 1, lines 17-18).

Re claim 9: Hatwar discloses, in figure 10 and throughout the disclosure, an organic light-emitting device comprising:

- an anode (220a);
- a first hole transporting layer (341) over the anode (220a);
- a second hole transporting layer (341a) over the first hole transporting layer (341),
    - wherein the second hole transporting layer (341a) is doped with a phosphorescent material (column 15, line 19);

- a first electron transporting layer (343a) over the second hole transporting layer (341a),
    - wherein the first electron transporting layer ~~id~~ is doped with the phosphorescent material (column 5, line 21);
- a second electron transporting layer (343) over the first electron transporting layer (343a); and
- a cathode (230) over the second electron transporting layer (343).

Re claim 19: Hatwar discloses, in figure 10 and throughout the disclosure, an organic light-emitting device comprising:

- a substrate (210);
- an anode (220a) over the substrate (210);
- a first hole transporting layer (341) over the anode (220a);
- a second hole transporting layer (341a) over the first hole transporting layer (341),
    - wherein the second hole transporting layer (341a) is doped with a phosphorescent material (column 15, line 19);
- a first electron transporting layer (343a) over the second hole transporting layer (341a),
    - wherein the first electron transporting layer id doped with the phosphorescent material (column 5, line 21);

- a second electron transporting layer (343) over the first electron transporting layer (343a); and
- a cathode (230) over the second electron transporting layer (343).

Re claim 28: Hatwar discloses the substrate comprising a member of the group consisting of plastic, metal and glass (column 5, lines 5-6).

Re claim 29: Hatwar discloses the substrate being substantially transparent (column 4, line 15).

Re claim 30: Hatwar discloses the substrate being opaque, and the cathode being transparent (column 4, lines 10-13).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 12,13,22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatwar.

Re claims 12 and 22: Hatwar shows all the limitations as shown above.

However, Hatwar is silent as to the IP energy of the first hole transporting layer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement a first hole transporting layer having an IP energy not more than 0.7 eV greater than the IP energy of the anode for the purpose of optimizing the light emitted from the organic light emitting device. By limiting the deviance in IP energy from one layer to another, the number of holes emitted from the hole transport layer is significantly increased. The increase in the number of holes emitted from the hole transport layer increases the brightness of the devices while using less power.

Re claims 13 and 23: Hatwar shows all the limitations as shown above.

However, Hatwar is silent as to the IP energy of the first hole transporting layer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement a first hole transporting layer having an IP energy not more than 0.5 eV greater than the IP energy of the anode for the purpose of optimizing the light emitted from the organic light emitting device. By limiting the deviance in IP energy from one layer to another, the number of holes emitted from the hole transport layer is significantly increased. The increase in the number of holes emitted from the hole transport layer increases the brightness of the devices while using less power.

Claims 4-6,14-16,24-26 and 32-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatwar as applied to claims 1,9 and 19 above, and further in view of Aziz et al. (US Patent 6,614,175; hereinafter Aziz).

Re claim 4: Hatwar shows all the limitations as shown above.

However, Hatwar fails to teach or fairly suggest the electron transporting layer comprising of a member of the group consisting of an oxadiazole, an oxadiazole derivative, a phenanthroline, a substituted benzoxazole, an un-substituted benzoxazole, a substituted benzthiazole, and an un-substituted benzthiazole compound.

Aziz discloses the electron transporting layer comprises a member of the group consisting of an oxadiazole, an oxadiazole derivative, a phenanthroline, a substituted benzoxazole, an un-substituted benzoxazole, a substituted benzthiazole, and an un-substituted benzthiazole compound (column 17, line 35- column 18 line 25).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use one of the materials disclosed by Aziz for the electron transport layer of Hatwar because the holes injected from the hole transport layer are more efficiently converted thereby increasing the overall brightness and efficiency of the device.

Re claims 5,15,25 and 38: Hatwar shows all the limitations above.

However, Hatwar fails to teach or fairly suggest the electron transporting layer comprising a member of the group consisting of OXD-7, BCP, a BCP derivative and TAZ.

Aziz discloses an electron transporting layer comprising a member of the group consisting of OXD-7, BCP, a BCP derivative and TAZ (column 17, line 35-column 18, line 25).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use one of the materials disclosed by Aziz for the electron transport layer of Hatwar because the holes injected from the hole transport layer are more efficiently converted thereby increasing the overall brightness and efficiency of the device.

Re claims 6,16,26 and 39: Hatwar shows all the limitations above.

However, Hatwar fails to teach or fairly suggest the phosphorescent material comprised of a member of the group consisting of Pt(ppy)(acac), Pt(tpy)(acac), Pt(bzq)(acac), Pt(btp)(acac), Pt(4,6-F2ppy)(acac), Pt(4,5-F2ppy)(acac), Pt(4,5-F2ppy)(pico), and I(4,6-F2ppy)(pico).

Aziz discloses a phosphorescent material comprised of a member of the group consisting of Pt(ppy)(acac), Pt(tpy)(acac), Pt(bzq)(acac), Pt(btp)(acac), Pt(4,6-F2ppy)(acac), Pt(4,5-F2ppy)(acac), Pt(4,5-F2ppy)(pico), and I(4,6-F2ppy)(pico) (column 18, line 32-column 19, line 3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the phosphor disclosed by Aziz for that disclosed by Hatwar because the change in phosphor changes the color emitted by the overall device thereby creating the desired color emission.

Re claims 14,24 and 37: Hatwar shows all the limitations above.

However, Hatwar fails to teach or fairly suggest the first electron transporting layer comprising a member of the group consisting of an oxadiazole, an oxadiazole derivative, a phenanthroline, a substituted benzoxazole, an un-substituted benzoxazole, a substituted benzthiazole, and an un-substituted benzthiazole compound, where wherein the second electron transporting layer comprises a member of the group consisting of Alq3 and a phthalocyanine compound.

Aziz discloses the first electron transporting layer comprising a member of the group consisting of an oxadiazole, an oxadiazole derivative, a phenanthroline, a substituted benzoxazole, an un-substituted benzoxazole, a substituted benzthiazole, and an un-substituted benzthiazole compound (column 17, line 35- column 18 line 25), where wherein the second electron transporting layer comprises a member of the group consisting of Alq3 and a phthalocyanine compound (column 17, line 26).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use one of the materials disclosed by Aziz for the electron transport layer of Hatwar because the holes injected from the hole transport layer are more efficiently converted thereby increasing the overall brightness and efficiency of the device.

Re claim 32: Hatwar shows all the limitations as shown above.

However, Hatwar fails to teach or fairly suggest inverting the light-emitting structure so as to have the cathode in contact with the substrate.

Aziz discloses, in figures 3 and 4 and throughout the disclosure, an inverted light-emitting device wherein the cathode (38) is in contact with the substrate (31).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to invert the organic light-emitting device of Hatwar because more light can be emitted from the top of the structure, through the anode, without the interference of the substrate thereby increasing the brightness of the device.

Re claim 33: Hatwar discloses an organic light-emitting device that emits light in the blue region of the visible spectrum (column 14, line 19).

Re claims 34: Hatwar discloses the hole transporting layer comprises a member of the group consisting α-NPD, TPD, M14, MTDATA, HMTPD and R854 (column 5, line 45-column 6, line 8).

Re claim 35: Hatwar shows all the limitations as shown above.

However, Hatwar is silent as to the IP energy of the first hole transporting layer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement a first hole transporting layer having an IP energy not more than 0.7 eV greater than the IP energy of the anode for the purpose of optimizing the light emitted from the organic light emitting device. By limiting the deviance in IP energy from one layer to another, the number of holes emitted from the hole transport

layer is significantly increased. The increase in the number of holes emitted from the hole transport layer increases the brightness of the devices while using less power.

Re claim 36: Hatwar shows all the limitations as shown above.

However, Hatwar is silent as to the IP energy of the first hole transporting layer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement a first hole transporting layer having an IP energy not more than 0.5 eV greater than the IP energy of the anode for the purpose of optimizing the light emitted from the organic light emitting device. By limiting the deviance in IP energy from one layer to another, the number of holes emitted from the hole transport layer is significantly increased. The increase in the number of holes emitted from the hole transport layer increases the brightness of the devices while using less power.

Re claims 40: Hatwar discloses the cathode comprising a member of the group consisting of magnesium silver and a magnesium silver alloy (Table 1), and the anode comprising ITO (column 10, line 6).

Re claim 41: Hatwar discloses the substrate comprising a member of the group consisting of plastic, metal and glass (column 5, lines 5-6).

Re claim 42: Hatwar discloses the substrate being substantially transparent (column 4, line 15).

Re claim 43: Aziz discloses the anode being transparent (column 14, lines 54-63).

Re claim 44: Hatwar discloses the organic light-emitting device being incorporated in an electronic device selected from the group consisting of the electronic device selected from the group consisting of a billboard, a sign, a computer monitor, a vehicle, a telecommunications device, a telephone, a printer, a television, a large area wall screen, a theater screen and a stadium screen (column 1, lines 17-18).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Keaney whose telephone number is (571)272-2489. The examiner can normally be reached on Monday-Thursday 5:30-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571)272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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SUPERVISORY PATENT EXAMINER